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(58) Field of search

F2E

(54) Spot-type disc brake, spring

(57) Back plate 16 of brake shoe 8 has attachment 24 not covered by friction lining, at which attachment 24 a wire spring 30 is secured by means of two substantially U-shaped portions 32, 34 thereof embracing attachment 24; the portions 32, 34 are linked by a connecting portion 36 (V-shaped in Figs. 1, 2 but U-shaped in other embodiments) on the side of back plate 16 remote from friction pad 18 and the connecting portion 36 penetrates into bore 28 in attachment 24 under axial preload. The U-shaped portions 32, 34 terminate in stems 38, 40 (which may intersect as in Figs. 1, 2) and take support at brake caliper 7 or a brake carrier. Various embodiments are shown and described giving further details of the form of the spring 30 and in particular the fact that stems 35, 39 of the U-shaped portions 32, 34 or the U-shaped connecting portion (Figs. 3-8) extend at a small angle (2° to 20°) relative to the plane of the back plate.

FIG.1

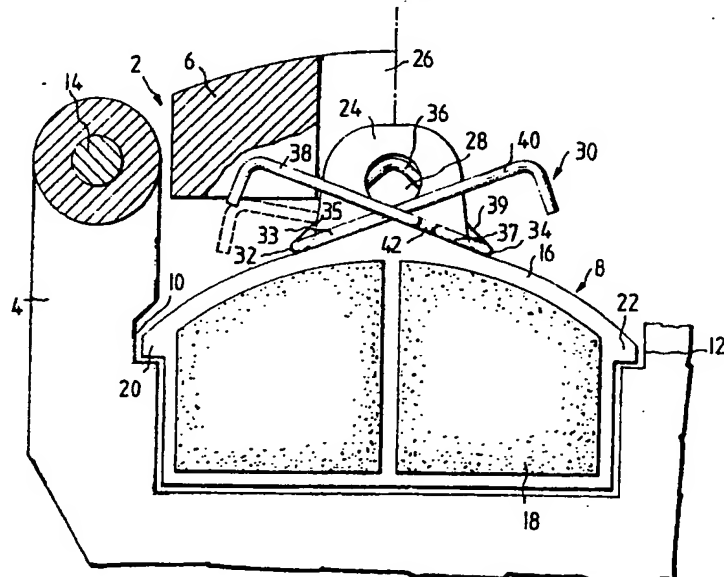
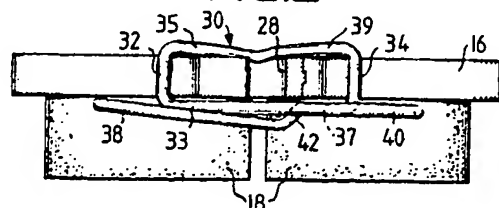


FIG.2



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FIG. 1

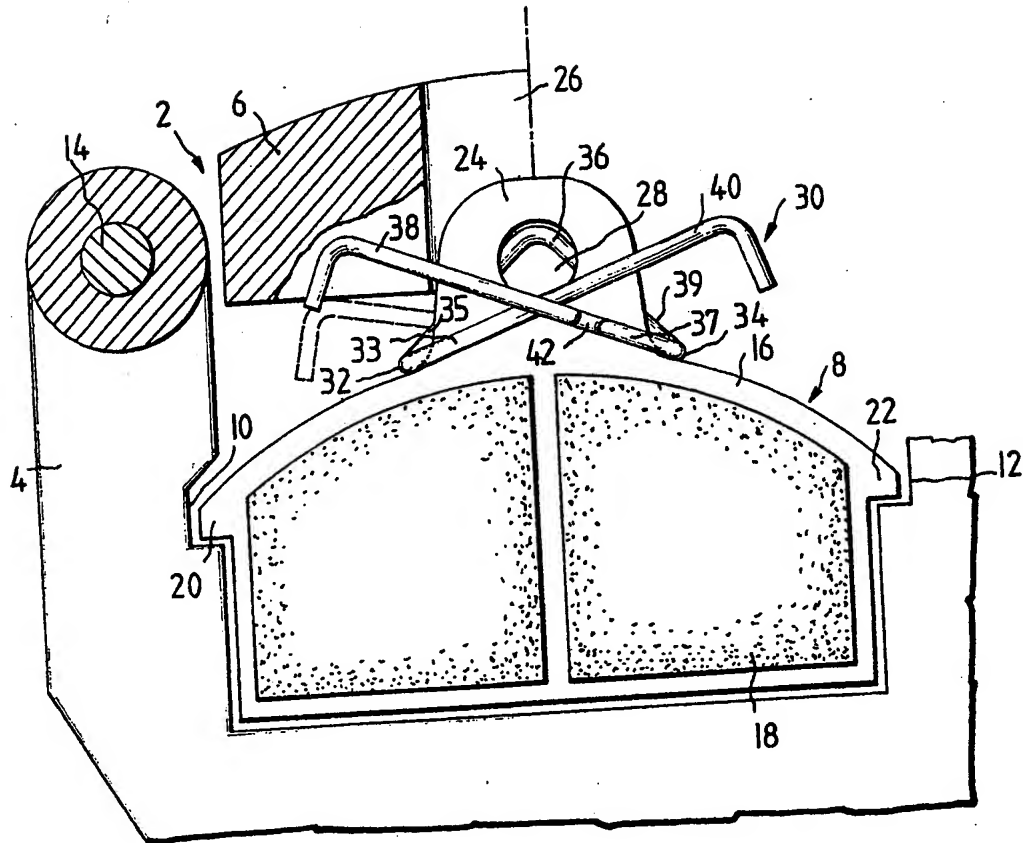


FIG. 2

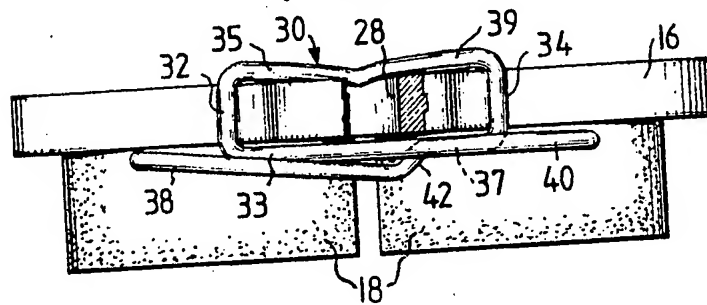


FIG. 3

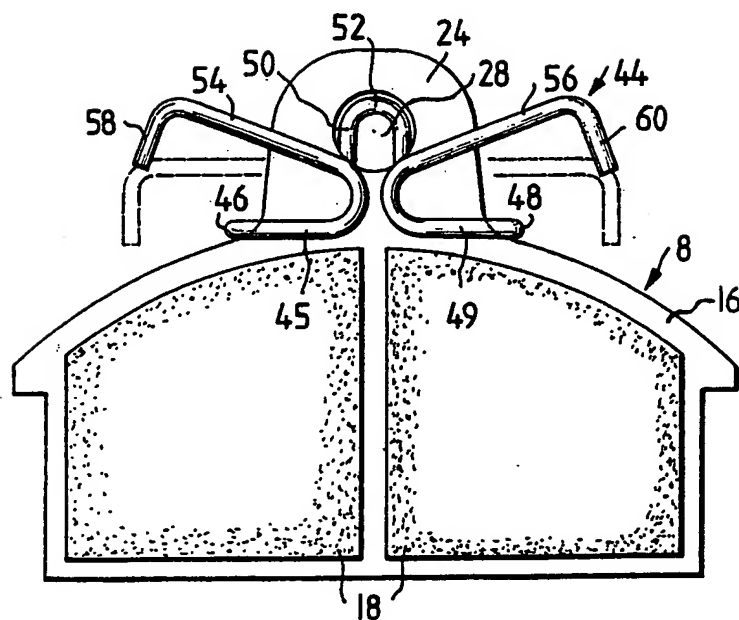


FIG. 4

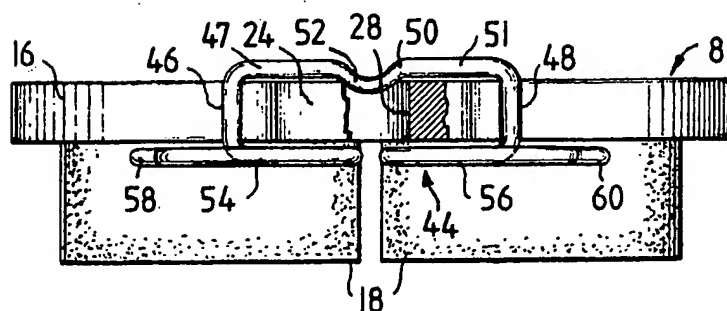


FIG. 5

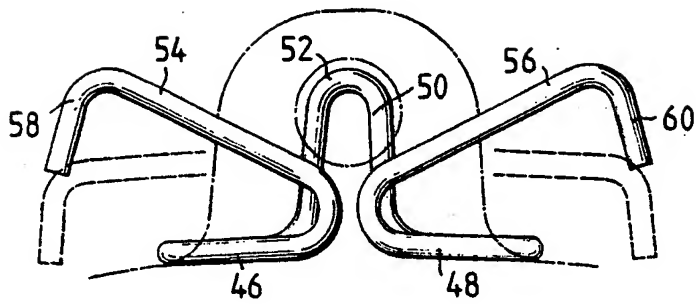


FIG. 6

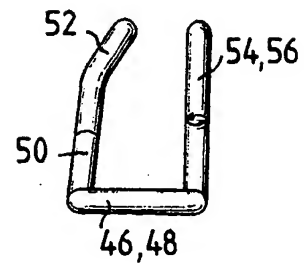


FIG. 7

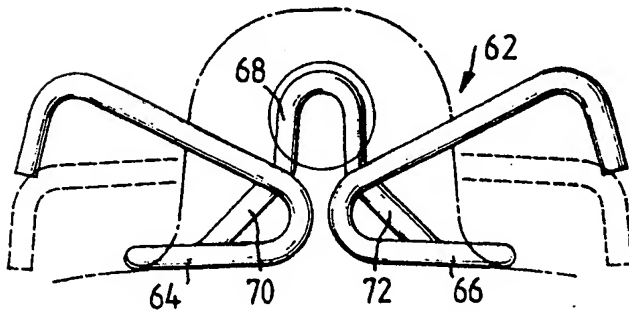
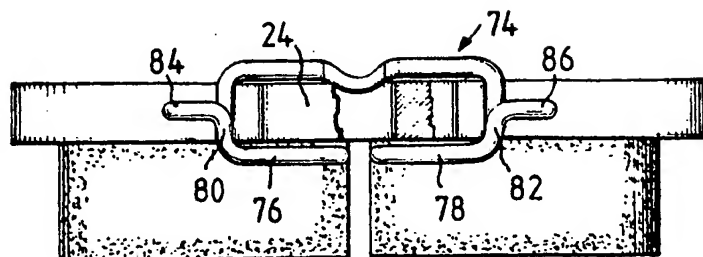


FIG. 8



SPECIFICATION

Spot-type disc brake

5 This invention relates to spot-type disc brakes and in particular to a spring arrangement for a brake shoe of a spot-type disc brake, of the kind wherein the brake shoe is formed with an attachment not covered by the friction lining
 10 and arranged at a carrier plate, at which attachment a wire spring is secured by means of a fixing portion closely embracing the attachment and engaging in an opening of the attachment, the wire spring being provided
 15 with at least one spring arm extending from the fixing portion and adapted to be supported at the brake carrier or brake caliper.

A spring arrangement of the kind referred to is known from German printed and published patent application 29 37 149. In this known spring arrangement, a spring preventing rattling noises is provided which has a bent portion of rectangular configuration and two outwardly and upwardly extending arms.
 25 The bent portion includes lateral parts seated in recesses which are formed by axially extending undercuts at the base of an upwardly-projecting attachment at the carrier plate. Preferably, the spring is wound around the tab in
 30 such a way as to render it difficult to remove the spring from that tab. Due to the fact that, in this spring, the fixing portion runs substantially in a plane which is perpendicular to that in which the back plate attachment extends,
 35 there is the risk of the spring tilting around a circumferentially directed axis, in particular due to manufacturing tolerances and under the effect of sliding movements of the pads which produce moments at the spring.

40 It is an object of the invention to create a spring arrangement at a brake shoe of a spot-type disc brake which ensures an improved seating at the brake shoe attachment in spite of manufacturing tolerances.

45 According to the invention in its broadest aspect, a spring arrangement for a brake shoe of a spot-type disc brake of the kind referred to is characterised in that the fixing portion of the wire spring is provided with at least one
 50 part extending substantially in a plane perpendicular to the plane of the back plate and one part running substantially at an angle, in particular in the range of 2 to 20°, relative to the plane of the back plate and being subject
 55 to a preload in respect to the attachment of the back plate.

The invention provides a spring arrangement for a brake shoe of a spot-type disc brake which, while being highly inexpensive to manufacture and easy to assemble, nevertheless fulfills any requirements of springs of this kind. In particular, a spring arrangement according to the invention provides for a firm, captive seating on the brake shoe, at the
 60 same time avoiding tilting of the spring. Ow-

ing to the fact that the spring is seated freely on the shoulder of the brake shoe, it is advantageously adapted to adjust itself spontaneously.

70 According to an advantageous embodiment of the invention the fixing portion of the spring embracing the attachment is provided with two U-shaped portions which are adapted to the cross-section of the attachment
 75 and the stems of the U-shaped portions extend in planes which are inclined, preferably at an angle in the range between 30 and 60°, in particular 45°, relative to the plane extending at right angles to the carrier plate. In this
 80 embodiment, which is of particular advantage when a V-shaped connecting portion is used, the portion which is slightly inclined relative to the plane of the back plate extends transversely across the reverse of the back
 85 plate attachment so that the force applied due to the preload acts in an advantageous manner. Expediently, the front stems feature a slightly flatter orientation than the back stems.

According to another embodiment which is
 90 favourable in particular from manufacturing technique aspects, the stems of the U-shaped portions extend substantially in a plane at right angles to the plane of extension of the carrier plate and parallel to the circumferential
 95 direction. In this embodiment, the slightly inclined portion on the reverse of the back plate may expediently be U-shaped and extend in a relatively narrow range. No detrimental stresses will occur during manufacture
 100 in the zone of the bends of the U-shaped portions.

In order to ensure a safe engagement in the opening of the back plate, the part running substantially at a small angle relative to the
 105 plane of the back plate is formed with an offset bent portion which is inclined at a larger angle in the range of 30° to 70°, in particular between 50° and 60°, relative to the back plate.

110 According to a further embodiment, the spring arms extend substantially parallel to the plane of the back plate. In this configuration, they may be crossed and run past each other, an outward deflection being opportunely provided in at least one of the spring arms in the
 115 range of the intersection. However, alternative solutions in which the arms are arranged side by side without intersection can also have advantages.

120 The ends of the spring arms are advantageously bent into the range in between the planes bounding the back plate at its front side and at its reverse in order to achieve a support of the spring arms without disturbing
 125 moments.

Embodiments of the invention will now be described by way of example with reference to the accompanying drawings in which:

Figure 1 is a diagrammatic partial view of a
 130 spot-type disc brake with a brake shoe pro-

vided with a spring which is supported at the caliper;

Figure 2 is a plan view of the brake shoe with the spring as in Figure 1;

5 Figure 3 is another version of a brake shoespring arrangement;

Figure 4 is a plan view of the brake shoespring arrangement in Figure 3;

10 Figure 5 is a front view of the spring employed in the arrangement according to Figures 3 and 4;

Figure 6 is a lateral view of the spring according to Figures 3 to 5;

15 Figure 7 shows a further version of the spring;

Figure 8 shows another version of the spring.

Reference is made first to Figures 1 and 2.

20 Figure 1 shows diagrammatically and only partially a spot-type disc brake 2 with a brake carrier 4, a caliper 6 and a brake shoe 8. The brake shoe 8 is axially slidably retained and supported in grooves 10, 12 of the brake carrier 4. The caliper 6 is axially slidable by

25 means of a pin guide 14 in a manner not illustrated in detail. The brake is actuated with the aid of a piston-cylinder arrangement (not shown) which is arranged at the caliper 6. The brake shoe 8 comprises a pad back plate 30 16 and a friction pad 18 fastened on it and shown in two parts in the drawing. Two attachments 20, 22 provided at the back plate 16 serve to support the brake shoe 8 in the grooves 10, 12 of the brake carrier 4.

35 In a central position, the back plate 16 is formed with a radially outwardly extending attachment 24 not covered by the friction lining, which attachment 24 projects into an opening 26 of the caliper 6. The attachment 40 24 has a substantially rectangular configuration, rounding off circles being, however, provided at its radially outward end and at the transition to the main part of the back plate 16. A through bore 28 is provided in the 45 centre of the attachment 24.

A spring 30 is seated on the attachment 24. This spring is furnished with two substantially U-shaped portions 32, 34 which embrace the narrow sides of the attachment 24

50 and which with their base portions are freely supported at the rounded portion of transition between the attachment 24 and the main part of the back plate 16.

The U-shaped spring portions 32, 34 are 55 linked to each other by a V-shaped connecting portion 36 on the side remote from the friction pads and are crossed over on the other side. On that other side, the U-shaped portions 32, 34 terminate in stems 38, 40 which 60 are radially inwardly angled off. In the range of intersection of the stems 38, 40, at least one of the stems, that is stem 38 in the drawing, is formed with an outward deflection 42 in order to permit the stems to run across 65 each other without interference. The stems of

th U-shaped portions 32, 34 interconnected by the V-shaped connecting portion 36 are positioned in a plane which is slightly inclined relatively to the plane of the back plate, at an 70 angle preferably between 5 and 15° so that the front part of the V-shaped connecting portion of the spring projects into the bore 28. This penetration into the bore 28 is achieved in that the U-shaped portions and 75 the V-shaped connecting portion are subject to an axial preload.

In the arrangement illustrated in Figure 1, the spring 30 is shown in continuous lines in its slack position and in dashed lines in its 80 tensioned position. In the tensioned position, the stems 38, 40 are supported at the caliper 6 with their angled portion.

Reference is now made to Figures 3 to 5 which show a different spring arrangement. 85 The brake shoe 8 illustrated in Figures 3 to 5 corresponds to the brake shoe 8 of Figures 1 and 2. As opposed to the spring 30 in Figures 1 and 2, a spring 44 is provided in this version which is distinguished by a different 90 design. While the spring 44 is again furnished with two substantially U-shaped portions 46, 48 which embrace the attachment 24 of the back plate 16, the front and back stems of the respective U-shaped portions are positioned in one and the same plane in this 95 version, that is in a plane extending vertically to the plane of extension of the attachment 24 and, in essence, tangentially to the circumferential direction. In the spring 44, the U-shaped portions 46, 48 are interconnected by 100 means of another U-shaped portion 50 which extends on the reverse of the back plate 16 at a small angle relative to the plane of the back plate 16. In its radially external portion, the U-shaped portion 50 is formed with an inwardly-inclined offset bend 52 by which it 105 engages in the bore 28. The offset bend 52 forms an angle in the range of 30 to 70°, in particular of 50 to 60°, with the horizontal line. On the side of the friction lining, the U-shaped portions 46, 48 terminate in stems 54, 56 which are bent away in the circumferential direction without crossing and are provided with bent off ends 58, 60. 110

Reference is now made to Figure 7 which illustrates a spring 62 which is generally similar to the spring 44 illustrated in Figures 3 to 6. As distinguished from the spring 44, however, in the area of transition from the U-shaped portions 64, 66 extending substantially vertically relative to the plane of the back plate 16 to the U-shaped portion 68 being slightly inclined in respect of the back plate 16, the spring 62 is formed with manufacturing technique reasons and directed at an 120 angle in the range between 30 and 60°, in particular at an angle of 45°.

Finally, in Fig. 8 a spring 74 is illustrated 130 whose stems 76, 78 are bent backward once

mor in the central part along the attachment 24. An additional bend 80, 82 is provided in the centre of the back plate. From this bend onward the ends 84, 86 of the spring stems extend in a circumferential direction.

CLAIMS

1. A spring arrangement for a brake shoe of a spot-type disc brake, of the kind wherein the brake shoe is formed with an attachment not covered by the friction lining and arranged at a carrier plate, at which attachment a wire spring is secured by means of a fixing portion closely embracing the attachment and engaging in an opening of the attachment, the wire spring being provided with at least one spring arm extending from the fixing portion and adapted to be supported at the brake carrier or brake caliper, characterised in that the fixing portion of the wire spring (30, 44, 62) is provided with at least one part (32, 34; 46, 48; 64, 66) extending substantially in a plane perpendicular to the plane of the back plate (16) and one part (35, 36, 39; 47, 50, 51; 70, 68, 72) running substantially at an angle, in the range of 2 to 20°, relative to the plane of the back plate (16) and being subject to a preload in respect of the attachment (24) of the back plate (16).

2. A spring arrangement as claimed in claim 1, characterised in that the angle is in the range of 5 to 15°.

3. A spring arrangement as claimed in claim 1 or 2, characterised in that the fixing portion of the spring (30; 44; 62) embracing the attachment (24) is provided with two U-shaped portions (32, 34; 46, 48; 64, 66) which are adapted to the cross-section of the attachment (24) and in that the stems (33, 35, 37, 39) of the U-shaped portions (32, 34) extend in planes which are inclined, preferably at an angle in the range between 30 and 60°, in particular 45°, relative to the plane extending at right angles to the carrier plate.

4. A spring arrangement as claimed in claim 2 or 3, characterised in that the stems (33, 35, 37, 39) of at least one of the U-shaped portions (32, 34) extend in different planes.

5. A spring arrangement as claimed in claim 1, characterised in that the stems (45, 47, 49, 51) of the U-shaped portions (46, 48) extend substantially in a plane at right angles to the plane of extension of the carrier plate and parallel to the circumferential direction.

6. A spring arrangement as claimed in any one of claims 2 to 4, characterised in that the part extending at a small angle relative to the plane of the back plate is constituted by a V-shaped connecting portion (36) interconnecting the U-shaped portions (32, 34), or their stems, which V-shaped connecting portion (36) may at least partially contain stems (35,

39) of the U-shaped portions (32, 34).

7. A spring arrangement as claimed in any one of claims 1 to 5, characterised in that the part extending at a small angle relative to the plane of the back plate is constituted by a U-shaped connecting portion (50) interconnecting the U-shaped portions (46, 48), or their stems, which U-shaped connecting portion (50) may at least partially contain stems (47, 51) of the U-shaped portions (46, 48).

8. A spring arrangement as claimed in any one of the preceding claims, characterised in that the part running substantially at a small angle relative to the plane of the back plate (16) is formed with an offset bent portion (52) which is inclined at a larger angle in the range of 30 to 70°, relative to the back plate (16).

9. A spring arrangement as claimed in claim 8, characterised in that the larger angle is in the range of 50 to 60°.

10. A spring arrangement as claimed in claim 8 or 9, characterised in that the offset bent portion (52) is provided at the free end of the connecting portion (36; 50; 68).

11. A spring arrangement as claimed in any one of the preceding claims, characterised in that the opening is a through bore (28).

12. A spring arrangement as claimed in any one of the preceding claims, characterised in that the spring arms (38, 40; 54, 56) extend substantially parallel to the plane of the back plate (16).

13. A spring arrangement as claimed in any one of the preceding claims, characterised in that the spring arms (38, 40) are crossed.

14. A spring arrangement as claimed in claim 10, characterised in that at least one of the spring arms (38) is formed with an outward deflection (42) in the range in which the spring arms are crossed.

15. A spring arrangement as claimed in any one of the preceding claims, characterised in that the spring arms (76, 78) at least partially extend in between the planes bounding the back plate (16).

16. A spring arrangement for a brake shoe of a spot-type disc brake substantially as described with reference to the accompanying drawings.

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